What Is Claimed Is:

1. A wavelength division multiplexing transmission system for transmitting wavelength division multiplexing signals, where signal lights with different signal bandwidths are wavelength division-multiplexed, comprising

at least one of a demultiplexing unit for demultiplexing said wavelength division multiplexing signals and a multiplexing unit for multiplexing a plurality of signal lights that are input, wherein

said demultiplexing unit further comprises a plurality of output ports for outputting demultiplexed signal lights, and each output port has transmission characteristics to be set such that the bandwidth of the transmission band where light transmits and the bandwidth of the non-transmission band where light does not transmit are different, and said transmission band is substantially the same as the signal band of the signal lights that are output from said output port out of said received wavelength division multiplexing signals, and

said multiplexing unit further comprises a plurality of input ports for inputting said plurality of signal lights, and filters and multiplexes the signal lights that are input from said plurality of input ports respectively based on the transmission characteristics of each input port, and each of said input ports has a transmission band which substantially matches with the

signal band of the signal lights to be input to said input port.

2. An optical receiver for receiving wavelength division multiplexing signals where signal lights with different signal bandwidths are wavelength-division multiplexed, comprising a demultiplexing unit for demultiplexing said wavelength division multiplexing signals and outputting the demultiplexed signal lights from a plurality of output ports, wherein

each output port has transmission characteristics to be set such that the bandwidth of the transmission band where the light transmits and the bandwidth of the non-transmission band where the light does not transmit are different, and said transmission band substantially matches with the signal band of the signal lights that are output from said output port out of said received wavelength division multiplexing signals.

3. The optical receiver according to Claim 2, wherein said wavelength division multiplexing signals further comprises first signal light with transmission bandwidth F1 and second signal lights with transmission bandwidth F2, which are arrayed alternately with the frequency interval F ($F \geq (F1 + F2)/2$), and

said demultiplexing unit is provided with an interleaver comprising:

an input port for inputting said first wavelength division multiplexing signals;

a first output port having a transmission band which substantially matches the signal band of said first signal light; and

a second output port having a transmission band which substantially matches with the signal band of said second signal light.

4. The optical receiver according to Claim 2, wherein said wavelength division multiplexing signal further comprises a first signal light with transmission bandwidth F1, and a second signal light with transmission bandwidth F2, which are arrayed alternately with the frequency interval F (F≥ (F1 + F2)/2),

said demultiplexing unit further comprises:

a first interleaver comprising a first port for inputting said wavelength division multiplexing signals and filtering and outputting said wavelength division multiplexing signals based on the transmission characteristics where the transmission band and the non-transmission band with the bandwidth 2F are alternately repeated, and a second port for filtering and outputting said wavelength division multiplexing signals based on the opposite transmission characteristics from said first port;

a second interleaver further comprising a third port for inputting the signal lights from said first port

and filtering and outputting the signal lights from said first port based on the transmission characteristics where the transmission band and the non-transmission band with the bandwidth 2F are alternately repeated and a fourth port for filtering and outputting the signal lights from said first port based on the opposite transmission characteristics from said third port; and

a third interleaver further comprising a fifth port for inputting the signal lights from said second port and filtering and outputting the signal lights from said second port based on the transmission characteristics where the transmission band and the non-transmission band with the bandwidth 2F are alternately repeated, and a sixth port for filtering and outputting the signal lights from said second port based on the opposite transmission characteristics from said fifth port;

wherein

the central frequency of the transmission bands of said first, second and third interleavers are shifted from the central frequency of the signal band of said first and second signal lights so that the overlapping portion of the transmission bands of said first and third ports include the signal band of said second signal light, the overlapping portion of the transmission bands of said first and fourth ports include the signal band of said first signal light, the overlapping portion of the transmission bands of said second and fifth ports include the signal band of said first

signal lights, and the overlapping portion of the transmission bands of said second and sixth ports include the signal bands of said second signal lights.

5. The optical receiver according to Claim 4, wherein the central frequency of the transmission band of said first port shifts F1/2 to the lower frequency side from the central frequency of the signal band of said second signal light, and

the central frequency of the transmission band of said third and fifth ports shifts F1/2 to the higher frequency side from the central frequency of the signal band of said second signal light.

6. The optical receiver according to Claim 4 or Claim 5, wherein said demultiplexing unit further comprises a demultiplexer for demultiplexing signal lights that are output from said third to sixth ports to signal lights with respective wavelengths.

7. The optical receiver according to Claim 2, wherein said wavelength division multiplexing signals further comprises a first signal lights with transmission bandwidth F1, and a second signal lights with transmission bandwidth F2, which are arrayed alternately with the frequency interval F ($F \geq (F1 + F2)/2$): and

said demultiplexing unit further comprises:

a coupler for inputting said wavelength division multiplexing signals and outputting said wavelength division multiplexing signals through two ports;

a first interleaver further comprising a first port for inputting said wavelength division multiplexing signals from said coupler and filtering and outputting said wavelength division multiplexing signals based on the transmission characteristics where the transmission band with the bandwidth F1, of which the center is the central frequency of the signal band of said first signal lights, is repeated with the period 4F, and a second port for filtering and outputting said wavelength division multiplexing signals based on the transmission characteristics where the transmission band with the bandwidth F1, which is shifted for the frequency 2F from the transmission band of said first port, is repeated with the period 4F; and

a second interleaver further comprising a third port for inputting said wavelength division multiplexing signals from said coupler and filtering and outputting said wavelength division multiplexing signals based on the transmission characteristics where the transmission band with the bandwidth F2, of which the center is the central frequency of the signal band of said second signal lights, is repeated with the period 4F, and a fourth port for filtering and outputting said wavelength division multiplexing signals based on the transmission characteristics where the transmission band with the

bandwidth F2, which is shifted for the frequency 2F from the transmission band of said third port, is repeated with the period 4F.

8. The optical receiver according to Claim 7, wherein said demultiplexing unit further comprises a demultiplexer for demultiplexing signal lights, that are output from said first to fourth ports, into signal lights with respective wavelengths.

9. The optical receiver according to Claim 2, wherein said wavelength division multiplexing signal further comprises a first signal lights with transmission bandwidth F1, and a second signal lights with transmission bandwidth F2 which are arrayed alternately with the frequency interval F ($F \geq (F1 + F2)/2$),

said demultiplexing unit further comprises:

a coupler for inputting said wavelength division multiplexing signals and outputting said wavelength division multiplexing signals through two ports;

a first interleaver further comprising a first port for inputting said wavelength division multiplexing signals from said coupler and filtering and outputting said wavelength division multiplexing signals based on the transmission characteristics where the transmission band and the non-transmission band with the bandwidth F2 are alternately repeated, and a second port for filtering and

outputting said wavelength division multiplexing signals based on the opposite transmission characteristics from said first port;

a second interleaver further comprising a third port for inputting said wavelength division multiplexing signals from said coupler and filtering and outputting said wavelength division multiplexing signals based on the transmission characteristics where the transmission band and the non-transmission band with the bandwidth 2F are alternately repeated, and a fourth port for filtering and outputting said wavelength division multiplexing signals based on the opposite transmission characteristics from said third port; and

a first to fourth demultiplexers for inputting signal lights from said first to fourth ports respectively, filtering the signal lights from said first to fourth ports respectively, demultiplexing the signal lights into signal lights with respective wavelengths and outputting them based on the transmission characteristics where the transmission band and the non-transmission band with the bandwidth 2F are alternately repeated, wherein

the central frequency of the transmission bands of said first and second interleavers and said first to fourth demultiplexers is shifted from the central frequency of said first and second signal lights so that the overlapping portion of the transmission bands of said first port and said first demultiplexer and the overlapping portion of the

transmission bands of said second port and said second demultiplexer include the signal band of said first signal lights, and the overlapping portion of the transmission bands of said third port and said third demultiplexer and the overlapping portion of the transmission bands of said fourth port and said fourth demultiplexer include the signal band of said second signal lights.

10. The optical receiver according to Claim 9, wherein

the central frequency of the transmission band of said first port shifts 3 x F1/2 to the higher frequency side from the central frequency of the signal band of said first signal light,

the central frequency of the transmission band of said first and second demultiplexers shifts 3 x F1/2 to the lower frequency side from the central frequency of the signal band of said first signal light,

the central frequency of the transmission band of said third port shifts F1/2 to the lower frequency side from the central frequency of the signal band of said second signal light, and

the central frequency of the transmission band of said third and fourth demultiplexers shifts F1/2 to the higher frequency side from the central frequency of the signal band of said second signal light.

11. The optical receiver according to Claim 2, wherein

said wavelength division multiplexing signal further comprises a first signal lights with transmission bandwidth F1 and second signal lights with transmission bandwidth F2, which are arrayed alternately with the frequency interval F ($F \geq (F1 + F2)/2$), and

said demultiplexing unit further comprises:

a coupler for inputting said wavelength division multiplexing signals and outputting said wavelength division multiplexing signals through two ports;

a demultiplexer for inputting said wavelength division multiplexing signals from said coupler, filtering said wavelength division multiplexing signals based on the transmission characteristics where the transmission band with the bandwidth F1, of which the center is the central frequency of the signal band of said first signal lights, is repeated with the period 2F, demultiplexing the signals into signal lights with respective wavelengths, and outputting them; and

an interleaver further comprising a first port for inputting said wavelength division multiplexing signals from said coupler, and filtering and outputting said wavelength division multiplexing signals based on the transmission characteristics where the transmission band with the bandwidth F2, of which the center is the central frequency of the signal band of said second signal lights, is repeated with the period 4F, and a second port for filtering and outputting said wavelength division multiplexing signals

based on the transmission characteristics where the transmission band with the bandwidth F2, which is shifted for the frequency 2F from the transmission band of said first port, is repeated with the period 4F.

12. The optical receiver according to Claim 11, wherein said demultiplexer further comprises a first and second demultiplexers for inputting signal lights from said first and second ports of said interleaver respectively, demultiplexing the signal lights that are input to signal lights with respective wavelengths, and outputting them.

13. The optical receiver according to Claim 2, wherein said wavelength division multiplexing signal further comprises a first signal lights with transmission bandwidth F1 and second signal lights with transmission bandwidth F2, which are arrayed alternately with the frequency interval F ($F \geq (F1 + F2)/2$), and said demultiplexing unit further comprises:

a coupler for inputting said wavelength division multiplexing signals and outputting said wavelength division multiplexing signals through two ports;

a first demultiplexer for inputting said wavelength division multiplexing signals from said coupler, filtering said wavelength division multiplexing signals based on the transmission characteristics where the transmission band with the bandwidth F1, of which the center

is the central frequency of the signal band of said first signal lights, is repeated with the period 2F, demultiplexing the signals into signal lights with respective wavelengths, and outputting them; and

a second demultiplexer for inputting said wavelength division multiplexing signals from said coupler, filtering said wavelength division multiplexing signals based on the transmission characteristics where the transmission band with the bandwidth F2, of which the center is the central frequency of the signal band of said second signal lights, is repeated with the period 2F, and demultiplexing the signals into signal lights with respective wavelengths, and outputting them.

14. The optical receiver according to Claim 2, wherein said wavelength division multiplexing signals further comprises a first signal light group of three first signal lights with transmission bandwidth F1 arrayed next to each other with frequency interval F1, and one second signal light with transmission bandwidth F2 (F2 ≤ F) positioned at a position of frequency interval F (F = 3 x F1) from the central frequency of the first signal light positioned at the center of said first signal light group, which are alternately arrayed, and

said demultiplexing unit further comprises:

a first interleaver further comprising a first port for inputting said wavelength division multiplexing

signals and filtering and outputting said wavelength division multiplexing signals based on the transmission characteristics where the transmission band with the bandwidth F, of which the center is the central frequency of the first signal light positioned at the center of said first signal light group, and the non-transmission band with the bandwidth F are alternately repeated, and a second port for filtering and outputting said wavelength division multiplexing signals based on the opposite transmission characteristics from said first port; and

a second interleaver further comprising a third port for inputting signal lights from said first port and filtering and outputting the signal lights from said first port based on the transmission characteristics where the transmission band with the bandwidth F1, of which the center is the central frequency of the first signal light positioned at the edge of said first signal light group, and the non-transmission band with the bandwidth F1 are alternately repeated, and a fourth port for filtering and outputting the signal lights from said first port based on the opposite transmission characteristics from said third port.

15. The optical receiver according to Claim 14, wherein said demultiplexing unit further comprises a first, second and third demultiplexers for inputting signal lights to be output from said second, third and fourth ports

respectively, and demultiplexing the signal lights that are input to signal lights with respective wavelengths.

16. The optical receiver according to Claim 2, wherein said wavelength division multiplexing signals further comprises a first signal light group of three first signal lights with transmission bandwidth F1 arrayed next to each other with frequency interval F1, and one second signal light with transmission bandwidth F2 (F2 ≤ F) positioned at a position of frequency interval F (F = 3 x F1) from the central frequency of the first signal light positioned at the center of said first signal light group, which are alternately arrayed, and

said demultiplexing unit further comprises:

a coupler for inputting said wavelength division multiplexing signals and outputting said wavelength division multiplexing signals through two ports;

a first interleaver further comprising a first port for inputting said wavelength division multiplexing signals from said coupler and filtering and outputting said wavelength division multiplexing signals based on the transmission characteristics where the transmission band with the bandwidth F1, of which the center is the central frequency of the first signal lights positioned at the edge of said first signal lights and the non-transmission band with the bandwidth F1, are alternately repeated, and a second port for filtering and outputting said wavelength

division multiplexing signals based on the opposite transmission characteristics from said first port; and

a second interleaver further comprising at least a third port for inputting said wavelength division multiplexing signals from said coupler, and filtering and outputting said wavelength division multiplexing signals based on the transmission characteristics where the transmission band of the bandwidth F, of which the center is the central frequency of the second signal lights and the non-transmission band with the bandwidth F are alternately repeated.

17. The optical receiver according to Claim 16, wherein said demultiplexing unit further comprises a first, second and third demultiplexers for inputting signal lights to be output from said first, second and third ports respectively, and demultiplexing the signal lights that are input to signal lights with respective wavelengths.

18. An optical transmitter for wavelength division multiplexing and transmitting a plurality of signal lights with a different signal bandwidth, comprising

a multiplexing unit that further comprises a plurality of input ports for inputting said plurality of signal lights, and that filters and multiplexes the signal lights which are input from said plurality of input ports respectively based on the transmission characteristics of

each port, wherein

each input port of said multiplexing unit has a transmission band which substantially matches with the signal band of the signal lights to be input to said input port.

19. The optical transmitter according to Claim 18, wherein said plurality of signal lights comprises:

a first signal light group consisting of a plurality of signal lights each having a transmission bandwidth F1 and being arrayed with the frequency interval 4F;

a second signal light group consiting of a plurality of signal lights each having transmission bandwidth F2 and being arrayed at the positions at frequency interval F ($F \geq (F1 + F2)/2$) from the central frequency of each signal light constituting said first signal light group;

a third signal light group consisting of a plurality of signal lights each having transmission bandwidth F1 and being arrayed at the positions at frequency interval 2F from the central frequency of each signal light constituting said first signal light group; and

a fourth signal light group consisting of a plurality of signal lights each having said transmission bandwidth F2 and being arrayed at positions at frequency interval 2F from the frequency of each signal light

constituting said second signal light group,

said multiplexing unit further comprises:

a first interleaver which further comprises a first port for inputting said first signal light group with the transmission characteristics where the transmission band and the non-transmission band with the bandwidth F are alternately repeated, and a second port for inputting said second signal light group with the opposite transmission characteristics from said first port, and multiplexes and outputs said first and second signal light groups which were input to said first and second ports respectively;

a second interleaver which further comprises a third port for inputting said third signal light group with the transmission characteristics where the transmission band and the non-transmission band with the bandwidth F are alternately repeated, and a fourth port for inputting said fourth signal light group with the opposite transmission characteristics from said third port, and multiplexes and outputs said third and fourth signal light groups which were input to said third and fourth ports; and

a third interleaver which further comprises a fifth port for inputting signal lights from said first interleaver with the transmission characteristics where the transmission band and the non-transmission band with the bandwidth F are alternately repeated, and a sixth port for inputting signal lights from said second interleaver with the opposite transmission characteristics from said fifth

port, and multiplexes and outputs the signal lights which were input to said fifth and sixth ports, and

wherein the central frequency of the transmission bands of said first, second and third interleavers are shifted from the central frequency of each signal light of said first and second signal light groups so that the overlapping portion of the transmission bands of said first and fifth ports include the signal band of each signal light of said first signal light group, the overlapping portion of the transmission bands of said second and fifth ports include the signal band of each signal light of said second signal group, the overlapping portion of the transmission bands of said third and sixth ports include the signal band of each signal light of said third signal light group, and the overlapping portion of the transmission bands of said fourth and sixth ports include the signal band of each signal light of said fourth signal light group.

20. The optical transmitter according to Claim 19, wherein

the central frequency of the transmission band of said first and fourth ports shift F1/2 to the higher frequency side from the central frequency of each signal light of said second signal light group, and

the central frequency of the transmission band of said fifth port shifts F1/2 to the lower frequency side from the central frequency of the signal band of each signal

light of said second signal light group.

21. The optical transmitter according to Claim 19 or Claim 20, wherein

said multiplexing unit further comprises:

a first multiplexer for multiplexing each signal light of said first signal light group, generating said first signal light group and inputting the same to said first port;

a second multiplexer for multiplexing each signal light of said second signal light group, generating said second signal light group, and inputting the same to said second port;

a third multiplexer for multiplexing each signal light of said third signal light group, generating said third signal light group, and inputting the same to said third port; and

a fourth multiplexer for multiplexing each signal light of said fourth signal light group, generating said fourth signal light group, and inputting the same to said fourth port.

22. The optical transmitter according to Claim 18, wherein

said plurality of signal light further comprises:

a first signal light group consisting of a plurality of signal lights each having a transmission

bandwidth F1 and being arrayed with the frequency interval 4F;

a second light group consisting of a plurality of signal lights each having transmission bandwidth F1 and being arrayed at the position at frequency interval 2F from the central frequency of each signal light constituting said first signal light group;

a third signal light group consisting of a plurality of signal lights each having transmission bandwidth F2 and being arrayed at the position at frequency interval F ($F \geq (F1 + F2)/2$) from the central frequency of each signal light constituting said first signal light group; and

a fourth signal light group consisting of a plurality of signal lights each having said transmission band F2 and being arrayed at positions at frequency interval 2F from the frequency of each signal light constituting said third signal light group, and

wherein the optical transmitter further comprises:

a first interleaver which further comprises a first port for inputting said first signal light group and filtering and outputting said first signal light group based on the transmission characteristics which have the transmission band with bandwidth F1, of which the center is the central frequency of the signal band of each signal light of said first signal light group, and a second port for inputting said second signal light group and filtering

and outputting said third signal light group based on the transmission characteristics which have the transmission band with bandwidth F1, which is shifted for frequency 2F from the transmission band of said first port, multiplexes said filtered first and second signal light groups, and outputs the same;

a second interleaver which further comprises a third port for inputting said third signal light group and filtering and outputting said third signal light group based on the transmission characteristics which have the transmission band of bandwidth F2, of which the center is the central frequency of the signal band of each signal light of said third signal light group, and a fourth port for inputting said fourth signal light group and filtering and outputting said fourth signal light group based on the transmission characteristics which have the transmission band with the bandwidth F2, which is shifted for frequency 2F from the transmission band of said third port, multiplexes said filtered third and fourth signal light groups, and outputs the same; and

a coupler for multiplexing the signal groups from said first and second interleavers, and outputting the same.

23. The optical transmitter according to Claim 22, wherein

said multiplexing unit further comprises:

a first multiplexer for multiplexing each signal

light of said first signal light group, generating said first signal light group and inputting the same to said first port;

a second multiplexer for multiplexing each signal light of said second signal light group, generating said second signal light group, and inputting the same to said second port;

a third multiplexer for multiplexing each signal light of said third signal light group, generating said third signal light group, and inputting the same to said third port; and

a fourth multiplexer for multiplexing each signal light of said fourth signal light group, generating said fourth signal light group, and inputting the same to said fourth port.

24. The optical transmitter according to Claim 18, wherein

said multiplexing unit further comprises:

a first multiplexer having a transmission bandwidth F1, for inputting a plurality of signal lights arrayed with frequency interval 4F, filtering said plurality of signal lights which were input based on the transmission characteristics where the transmission band and the non-transmission band with the bandwidth 2F are alternately repeated, multiplexing the signals into a first signal light group, and outputting the same;

a second multiplexer having transmission bandwidth F1 for inputting a plurality of signal lights arrayed at the position at the frequency interval 2F from the central frequency of each signal light of said first signal light group, filtering said plurality of signal lights which were input based on the transmission characteristics where the transmission band and the non-transmission band with the bandwidth 2F are alternately repeated, multiplexing the signals into a second signal light group, and outputting the same;

a third multiplexer having transmission bandwidth F2, inputting a plurality of signal lights arrayed at the position at the frequency interval F ($F \geq (F1 + F2)/2$) from the central frequency of each signal light of said first signal light group, filtering said plurality of signal lights which were input based on the transmission characteristics where the transmission band and the non-transmission band with the bandwidth 2F are alternately repeated, multiplexing the signals into a third signal light group, and outputting the same;

a fourth multiplexing unit having a transmission bandwidth F2, for inputting a plurality of signal lights arrayed at the position of the frequency interval 2F from the central frequency of each signal light of said third signal light group, filtering said plurality of signal lights which were input based on the transmission characteristics where the transmission band and the non-

transmission band with the bandwidth 2F are alternately repeated, multiplexing the signals into a fourth signal light group, and outputting the same;

a first interleaver which further comprises a first port for filtering said first signal light group from said first multiplexer based on the transmission characteristics where the transmission band and the non-transmission band with the bandwidth 2F are alternately repeated, and a second port for filtering said second signal light group from said second multiplexer based on the opposite transmission characteristics from said first port, and multiplexes and outputs said filtered first and second signal light groups;

a second interleaver which further comprises a third port for filtering said third signal light group from said third multiplexer based on the transmission characteristics where the transmission band and the non-transmission band with the bandwidth 2F are alternately repeated, and a fourth port for filtering said fourth signal light group from said fourth multiplexer based on the opposite transmission characteristics from said third port, and multiplexes and outputs said filtered second and fourth signal light groups; and

a coupler for multiplexing signal light groups from said first and second interleavers, and outputting the same, and

wherein the central frequencies of the

transmission bands of said first and second interleavers and said first to fourth demultiplexers are shifted from the central frequency of said first and second signal light groups, so that the overlapping portion of the transmission bands of said first port and said first demultiplexer and the overlapping portion of the transmission bands of said second port and said second demultiplexer include the signal band of each signal light of said first signal light group, and the overlapping portion of said third port and said third demultiplexer, and the overlapping portion of the transmission characteristics of said fourth port and said fourth demultiplexer include the signal band of each signal light of said second signal lights.

25. The optical transmitter according to Claim 23, wherein

the central frequency of the transmission band of said first port shifts 3 x F1/2 to the higher frequency side from the central frequency of each signal lights of said first signal light group,

the central frequency of the transmission band of said first and second multiplexers shifts 3 x F1/2 to the lower frequency side from the central frequency of each signal light of said first signal light group,

the central frequency of the transmission band of said third port shifts F1/2 to the lower frequency side from the central frequency of each signal light of said third

signal light group, and

the central frequency of the transmission band of said third and fourth multiplexers shifts F1/2 to the higher frequency side from the central frequency of each signal lights of said third signal light group.

26. The optical transmitter according to Claim 18, wherein

said multiplexing unit further comprises:

a multiplexer for inputting a plurality of first signal lights having the transmission bandwidth F1 with frequency interval 2F (F > F1), filtering said plurality of first signal lights based on the transmission characteristics having the transmission band with the bandwidth F1, of which the center is each central frequency of said plurality of first signal lights, and multiplexing the signals into a first signal light group, and outputting the same;

an interleaver which further comprises a first port for inputting a second signal light group, where a plurality of second signal lights with the transmission bandwidth F2 are arrayed at positions at the frequency interval F ($F \geq (F1 + F2)/2$) from the central frequency of every other signal band of said first signal light group, and filtering said second light signal group based on the transmission characteristics having the transmission band with the bandwidth F2, of which the center is the central

frequency of each signal band of said second signal light group, and a second port for inputting a third signal light group, where a plurality of third signal lights with the transmission bandwidth F2 are arrayed at positions at the frequency interval F from the central frequency of every other signal band, which is different from said every other signal band, of said first signal light group, and filtering said third signal light group based on the transmission characteristics having the transmission band with the bandwidth F2, of which the center is the central frequency of each signal band of said third signal light group, and multiplexes and outputs said second and third signal light groups after filtering; and

a coupler for multiplexing the signal lights from said multiplexer and said interleaver, and outputting the same.

27. The optical transmitter according to Claim 25, wherein

said multiplexing unit further comprises:

a first multiplexer for inputting said plurality of second signal lights at positions of the frequency interval F from the central frequency at every other signal band of said first signal lights group with frequency interval 4F, multiplexing said plurality of second signal lights which were input, and outputting the same to said first port; and

a second multiplexer for inputting said plurality of third signal lights at positions at the frequency interval F from the central frequency of every other signal band, which is different from said every other signal band, of said first signal light group with frequency interval 4F, multiplexing said plurality of second signal lights which were input, and outputting the same to said second port.

28. The optical transmitter according to Claim 18, wherein

said multiplexing unit further comprises:

a first multiplexer for inputting a plurality of first signal lights having the transmission bandwidth F1 with frequency interval 2F (F > F1), filtering said plurality of first signal lights based on the transmission characteristics having the transmission band with the bandwidth F1, of which the center is each central frequency of said plurality of first signal lights, multiplexing the signals into a first signal light group, and outputting the same;

a second multiplexer for inputting a plurality of second signal lights with the transmission bandwidth F2 ($F \geq (F1 + F2)/2$) at the frequency positions which is shifted for frequency F from each central frequency of said plurality of first signal lights, filtering said plurality of second signal lights based on the transmission characteristics having the transmission band with the bandwidth F2, of which

the center is each central frequency of said plurality of second signal lights, multiplexing the signals into a second signal light group, and outputting the same; and

a coupler for multiplexing the signal lights from said first and second multiplexers, and outputting the same.

29. The optical transmitter according to Claim 18, wherein

said multiplexing unit further comprises a first interleaver comprising:

a first port for inputting a first signal light group where a plurality of sets of three first signal lights with transmission bandwidth F1, which are arrayed adjacent to each other with the frequency interval F1, are arrayed with the frequency interval 6 x F1, and filtering said first signal light group based on the transmission characteristics having the transmission band with the bandwidth 3 x F1, of which the center is the central frequency of the first signal light positioned at the center of each set of said first signal light group; and

a second port for inputting a second signal light group which is comprised of a plurality of second signal lights with the transmission bandwidth F2 ($F2 \leq 3 \times F1$), of which the center is the frequency shifted for the frequency 3 X F1 from the central frequency of the first signal light positioned at the center of each set of said first signal light group, and filtering said second signal light group

based on the opposite transmission characteristics from said first port, and

whrein said first interleaver multiplexes said first and second signal light groups after filtering, and outputs the same.

30. The optical transmitter according to Claim 28, wherein

said multiplexing unit further comprises a second interleaver comprising:

a third port for inputting a third signal light group which is comprised of first signal lights at both ends of each set of said first signal light group, and filtering said third signal light group based on the transmission characteristics where the transmission band with the bandwidth F1, of which the center is the central frequency of the first signal light at one of said both ends and the non-transmission band with the bandwidth F1, which is adjacent thereto are alternately repeated; and

a fourth port for inputting a fourth signal light group which is comprised of first signal lights at the center of each set of said first signal light group, and filtering said fourth signal group based on the opposite transmission characteristics from said third port, and

wherein said second interleaver multiplexes said third and fourth signal light groups after filtering, and outputs the same.

31. The optical transmitter according to Claim 18, wherein

said multiplexing unit further comprises:

a first interleaver which comprises a first port for inputting a third signal light group which is comprised of first signal lights at both ends of each set out of the first signal group where a plurality of sets of three first signal lights with the transmission bandwidth F1 which are arrayed adjacent to each other with frequency interval F1, are arrayed with the frequency interval 6 X F1, and filtering said third signal light group based on the transmission characteristics having the transmission band with the bandwidth F1, of which the center is the central frequency of the first signal light at one of said both ends and the non-transmission band with the bandwidth F1 which is adjacent thereto are alternately repeated, and a second port for inputting a fourth signal light group which is comprised of first signal lights at the center of each set of said first signal light group, for filtering said fourth signal group based on the opposite transmission characteristics from said first port, multiplexes said third and fourth signal light groups after filtering, and outputs the same;

a second interleaver for inputting a second signal light group which is comprised of a plurality of second signal lights with the transmission bandwidth F2 (F2≤ 3 X F1), of which the center is the frequency shifted for

frequency 3 X F1 from the central frequency of the first signal light positioned at the center of each set of said first signal light group, and filtering and outputting said second signal light group based on the transmission characteristics where the transmission band with the bandwidth F2, of which the center is the central frequency of each second signal light, and the non-transmission band with bandwidth F2 adjacent thereto, are alternately repeated; and

a coupler for multiplexing the signal light groups from said first and second interleavers.